

Momentum



A model for collisions

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2023 - Physics

Linear Momentum

The *linear momentum* \vec{p} of a single object is the product of its mass m and velocity \vec{v} :

$$\vec{p} = m\vec{v}$$

Momentum is a
vector quantity!

Momentum is a
conserved quantity
in closed systems

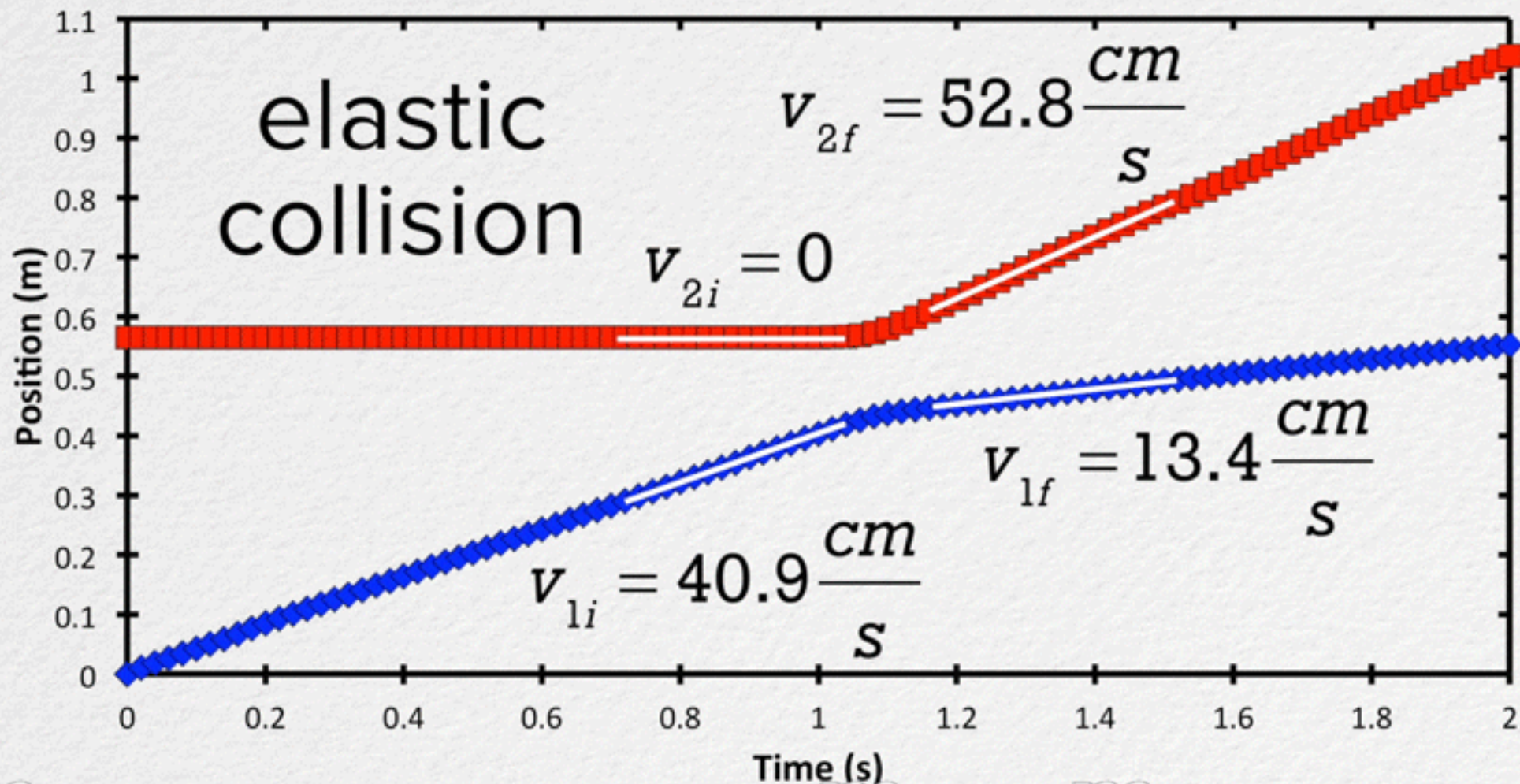
Momentum conservation:

In general momentum of a system is conserved:

$$p_{before} = p_{after}$$

Which can look like...

$$m_1 \vec{v}_{1i} + m_2 \vec{v}_{2i} = m_1 \vec{v}_{1f} + m_2 \vec{v}_{2f}$$



$= 2m$

$m_2 = m$



Collision Types

- Elastic - Kinetic Energy is conserved, "*bouncy*"
- Inelastic - Kinetic energy is not conserved, "*sticky*"
- Explosions - Objects start together and *explode* away from each other

Elastic Collisions



Elastic.

Inelastic Collisions



Totally Inelastic *Sticky* Collisions

Momentum Bar Graphs

![[bg left]](G:\My
Drive\GitHub\mrporterphysics.github.io\Presentations\Momentum\figures\pbargraph.png)